A PROFILE OF TAXI DRIVERS' ROAD SAFETY ATTITUDES AND BEHAVIOURS: IS SAFETY IMPORTANT?

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Abstract

Crash data involving taxis indicates that such drivers are over represented in crashes and are one to two times more likely to be involved in a fatality crash. However, currently there is little gathered evidence regarding taxi driver's attitudes and road safety perceptions and research has yet to examine the extent of this group's engagement in aberrant driving behaviours. This study reports on the utilisation of abbreviated versions of the Manchester Driver Behaviour Questionnaire (DBQ), Driver Attitude Questionnaire (DAQ) and the Safety Climate Questionnaire (SCQ) to provide a profile of the self-reported attitudes and corresponding driving behaviours of a sample of Queensland taxi drivers (N = 182). Questionnaires were individually distributed to participants at a taxi company depot as well as taxi ranks both during the day and night shifts. Univariate analyses identified that taxi drivers were more likely to report engaging in aggressive driving acts than speeding violations, and believed speeding was more acceptable compared to drink driving, following too closely or engaging in risky overtaking manoeuvres. Importantly, bivariate analyses indicated that individuals who engaged in a higher level of aberrant driving behaviours (e.g., aggression & speeding) were also more likely to report other less safe driving attitudes. However, examination of factors related with demerit point loss revealed that the only factor significantly associated with receiving fines was taxi driving experience, as more inexperienced drivers were more likely to report incurring demerit points. In contrast to previous research, road exposure did not significantly influence taxi-related crash and traffic offence involvement in this sample. Taken together, the results indicate that some taxi drivers willingly admit to engaging in unsafe driving practices and thus road safety benefits may result from developing and implementing targeted interventions designed to improve work-related driving among this group. This paper will further outline the major findings of the study as well as highlight possible research avenues to improve both current knowledge and taxi operating practices.

INTRODUCTION

Present Fleet Safety Context

There is a growing awareness in Australia and many other countries of the need to devote more attention to the issue of fleet and work related road safety. This is in part due to the growing body of evidence confirming the overall impact that fleet related safety issues have on business effectiveness and road safety (Downs et al, 1999; Haworth et al, 2000). In addition, over recent years, many jurisdictions have moved to clarify a vehicle used for the purpose of work as a "workplace" under Workplace Health and Safety (WHS) legislation (Hoskins, 2003). Therefore,

organisations are required to include work-related driving within their organisational WHS regulation compliance. Fleet and work related motor vehicle incidents represent a substantial emotional and financial cost to the community. In Australia, road crashes are the most common cause of work-related fatalities, injuries and absence from work (Haworth et al., 2000), with the average time lost being greater than any other workplace claim (Stewart-Bogle, 1999). Further research has shown that work-related traffic injuries are about twice as likely to result in death or permanent disability than other workplace accidents (Wheatley, 1997) and account for up to 49% of work related fatalities in Australia.

It has previously been estimated that the total cost of work related road incidents in Australia is in the vicinity of $1.5 billion (Wheatley, 1997) and more recently the average total insurance cost of a fleet incident to organisations and society is estimated at $28 000 (Davey & Banks, 2005). However, estimates of the true cost for work related crashes suggest that hidden costs may be somewhere between 4-36 times vehicle repair/replacement costs (Murray et al, 2003). These hidden costs include items such as, workers compensation, medical costs associated with injury to staff, injury rehabilitation, injury to third party, third party property loss, loss of productivity due to days off work, loss of position and staff backfill costs as a result of absence from work, legal costs associated with workers compensation and third party claims, increased risk, insurance premiums and potential loss of customers. However, despite the economic and personal impact of fleet-related vehicle crashes, comparatively little national and international research has endeavoured to identify the underlying factors associated with increased risk of crash involvement.

Taxi Road Safety Context

Statistics reported in a briefing paper to the STAYSAFE Committee regarding workplace safety and public safety issues associated with the taxi industry revealed potentially alarming taxi crash rates. Based on Motor Accident Authority data for NSW in 1994 taxi's accounted for 0.2% of all registered vehicles, 1.9% of the vehicles involved in crashes and were involved in 3.2% of all reported crashes (Staysafe 36, 1997). In addition, based on RTA data for 1994 taxis were involved in 5 fatalities, 122 serious injury crashes and 1107 non injury crashes where a vehicle had to be towed away (Staysafe 36, 1997). Compared to the NSW vehicle fleet as a whole, the crash rate varied. Furthermore, in the Staysafe 36 (1997), taxis were approximately 16 times more likely to be involved in a tow away crash and were approximately 4.5 times more likely to be involved in a fatality than other vehicles on register. Taxi drivers were somewhere between 1 and 2 times more likely to be involved in a fatality than other drivers. Based on such data it would appear that taxis are over represented in road crashes.

Self-Report Driving Measurement Tools

As a result of the tremendous financial and personal impact of road crashes, an increasing amount of attention is being focused on determining the link between motorists' self-reported driving behaviours and attitudes and their subsequent involvement in crashes and traffic offences. While a number of measurement tools have recently been developed to examine individuals' driving behaviours, the Manchester Driver Behaviour Questionnaire (DBQ) (Reason et al., 1990), and Driver Attitude Questionnaire (DAQ) (Parker et al., 1996) remain the predominant tools to assess general motorists' driving attitudes and outcomes. In addition within fleet context, the Safety Climate Questionnaire (SCQ) (Glendon & Litherland, 2001) is increasingly being utilised in work-related environments to determine the effect of safety rules, procedures, communication and support as well as management commitment on self-reported aberrant driving behaviours (Davey et al., 2006).

Firstly, in regards to the DBQ, the measurement tool has been extensively utilised within a range of driver safety research areas such as: the genetics of driving behaviour (Bianchi & Summala, 2004), age differences in driving behaviour (Dobson et al., 1999), cross cultural studies (Lajunen et al.,

2003) and associations with the likelihood of being involved in an accident (Dobson et al., 1999; Parker et al., 1995; Reason et al., 1990). Such research has predominantly focused on general motorists, which has indicated that speeding violations are one of the most common factors associated with crash involvement (Parker et al., 1995).

Secondly, another driving tool which is beginning to receive increasing attention within the road safety literature is the Driver Attitude Questionnaire (Parker et al., 1996). Research has begun to utilise the DAQ within a number of different applied settings such as: speed awareness training (Meadows, 2002), general driver training programs (Burgess & Webley, 2000), bicycle interventions (Anderson & Summala, 2004), as well as fleet programs (Davey et al., 2006). Preliminary research indicates that the DAQ has the potential to be implemented to investigate motorists' attitudes towards key road safety issues, such as drink driving, risky overtaking, close following and driving above the speed limit, with motorists generally reporting the most lenient attitudes towards speeding violations (Davey et al., 2006; Meadows, 2002).

Thirdly, the Safety Climate Questionnaire (SCQ) is being utilised within road safety arenas, as researchers begin to recognise the importance of an organisation's attitudes towards fleet and road safety issues. In simple terms, "climate" relates to how employees perceive the organisational culture and practice of a company (Glendon & Stanton, 2000), and it is hypothesised that this perception impacts upon the way in which workers ultimately behave at work (Wills, 2006). In regards to safety climate, a growing body of research is demonstrating a link between safety culture and a variety of outcomes, ranging from vehicle crash rates (Diaz & Cabrera, 1997; Mearns, Whitaker & Flin, 2003), to injury severity (Gillen et al., 2002). For example, Wills, Watson and Biggs (2006) investigated the driving behaviours of 323 fleet employees and reported that work pressure and communication were significantly related to driver distraction. Also, Newnam, Watson and Murray (2002) examined the self-reported driving behaviours of fleet drivers and reported that the safety policies and practices within organisations had a direct impact on driving performance. Taken together, research is beginning to suggest that perceptions regarding the safety policies and practices of organisations may have a direct impact on driving outcomes.

However, despite the considerable exposure on public roads, relatively little research has endeavoured to examine the self-reported driving behaviours of taxi drivers. In addition, little research could be found that examines the influence of taxi driver behaviours and the subsequent effect on crash and traffic offence involvement. As a result, the study aimed to:

a) examine a group of taxi drivers' attitudes and behaviours regarding road safety issues via three measurement tools (i.e., DBQ, DAQ & SCQ); and
b) investigate the relationship the sub-factors of the measurement tools have with self-reported crash involvement and demerit point loss.

METHOD

Participants

A total of 182 taxi drivers from a north Queensland region volunteered to participate in the study. There were 151 males (83 %) and 31 females (13%). The higher proportion of males in the sample reflects the nature of the occupation where the majority of drivers have traditionally been males. The average age of the sample was 50yrs, ranging from 21 to 72 years of age. In regards to work categories, the largest proportion of taxi drivers 'work/drive for an owner' (48%), with a further 25% of drivers that 'hire' the taxi, 19% are 'owner' drivers, and 8% 'lease' the taxi. Taxi shifts driven by participants were reported to be day shift (46%), night shift (38%), 'the same of each' (10%) and 'changes each week' (6%). On average participants had held their licence for 28 years (range 1 – 54yrs), had been driving a taxi for approximately 8 years (range 0.1 – 37yrs), with an average taxi driving exposure of approximately 53 hours per week, and 1189 kilometres per week.

A total of 38 participants reported being involved in a crash while driving taxis in the last year while 52 individuals reported incurring traffic infringements (i.e., demerit point loss) during the same time period.

Materials

Due to the nature of work for most taxi drivers, time for completing a survey is restricted to breaks between obtaining fares. Therefore, to encourage taxi drivers to participate in the survey and ensure completion rates, the various survey questionnaires were reduced in length to reduce the time required to complete the survey. Factor analytic procedures combined with an examination of alpha coefficients were implemented to develop abbreviated assessment tools.

Driver Behaviour Questionnaire (DBQ)

An abbreviated version of the DBQ used by Davey et al. (2006) was utilised in the research project. This DBQ was a modified version of the original DBQ developed by Reason et al. (1990) in order to make the questionnaire more representative of Australian work-related driving conditions. Respondents were required to indicate on a seven point likert scale (1 = never to 7 = always) how often they commit each of the errors (4 items), highway-code violations (4 items) and aggressive violations (2 items).

Driver Attitude Questionnaire (DAQ)

An abbreviated 12-item DAQ was also utilised to measure participants' attitudes regarding four main driving behaviours: drink driving, close-following, dangerous overtaking and speeding. Respondents were required to indicate on a seven point likert scale (1 = strongly disagree to 7 = strongly agree) their agreement with statements regarding the appropriateness of various driving behaviours.

Safety Climate Questionnaire (SCQ)

A 10 item abbreviated version of the SCQ was also utilised in the research project with minor modifications to ensure the questions related specifically to "work-related driving" and the Australian context (Davey et al., 2007). The SCQ contains 5 sub-factors that aim to measure perceptions towards fleet safety rules, communication and support, work pressures, adequacy of fleet safety procedure and management commitment. Recent research has demonstrated that the SCQ is a reliable tool to measure work-related drivers' attitudes towards the safety climate of an organisation (Davey et al., 2006; Wills et al., 2006; Wills et al, 2007).

Demographic Measures

A number of socio-demographic questions were included in the questionnaire to determine participants' age, gender, driving history (e.g., years experience, number of traffic offences and crashes) and their weekly driving exposure (e.g., kilometres, driving hours).

Procedure

The chief researcher distributed and collected the survey questionnaires over a three day period. Participants (taxi drivers) were asked to travel to the local Taxi Depot if they agreed to complete the survey questionnaire. This was done on a gradual basis over two full day shifts so not to disrupt service to clients. The researcher also approached taxi drivers at various taxi ranks during both day and night shifts, for example, the local airport, city centre, casino and night club areas. Participants that could not complete the survey due to receiving a fare were given a pre-paid envelope and requested to post the survey once completed. Ten pre-paid envelopes were provided to drivers and all ten were returned. A total of 184 surveys were collected and of these 182 surveys were usable, two were discarded due to insufficient completed content for analysis. In total there are 480 licenced taxi drivers in the survey location indicating a response rate of 38%.

RESULTS

Structure and Reliability of the Survey Scales for an Australian Taxi Driver Sample

The internal consistency of the SCQ, DBQ and DAQ scores were examined through calculating Cronbach's alpha reliability coefficients, which are presented in Table 1. The SCQ factors, which specifically relate to safety, appear to exhibit the highest level of internal consistency. Similar to previous Australian research (Blockey & Hartley, 1995; Dobson et al., 1999), and on professional drivers (Sullman et al., 2002), the DBQ factors also appear to exhibit relative internal consistency. In contrast, there has been little research to determine the psychometric properties of the DAQ, and although only moderate, the alpha coefficients are similar to previous research (Davey et al., 2006; Meadows, 2002).

Table 1. *Alpha reliability coefficients of the SCQ, DBQ and DAQ scales*

SCQ		
Fleet safety rules	(2 items)	.81
Communication and support	(2 items)	.75
Work pressures	(2 items)	.82
Adequacy of fleet safety procedures	(2 items)	.82
Management commitment	(2 items)	.81
DBQ		
Errors	(4 items)	.74
Highway-code violations	(4 items)	.84
Aggressive violations	(2 items)	.70
DAQ		
Alcohol	(3 items)	.57
Close Following	(3 items)	.67
Overtaking	(3 items)	.74
Speeding	(3 items)	.70

Table 2 reports the overall mean scores for the factors within the three scales. A higher mean for the SCQ and DAQ reveals a more appropriate attitude towards the road safety and safety climate factors, whereas a higher mean for the DBQ represents more active engagement in aberrant driving behaviours in the last 6 months. Examination of the mean scores indicates that of the four DAQ driving behaviours, participants were most likely to report that drink driving was generally an unacceptable behaviour in most circumstances (M = 6.40). The second highest factor was overtaking, followed by attitudes regarding close following. In contrast, participants were most likely to report that speeding was an acceptable behaviour (M = 4.39). Between group analyses demonstrated that participants' attitudes towards the unacceptability of drink driving were significantly higher than risky overtaking practices $F(1, 181) = 26.22$, $p = .000$, close following $F(1, 181) = 44.82$, $p = .000$ and especially speeding $F(1, 181) = 257.78$, $p = .000$. The results indicate that drink driving is perceived as the most serious offence in the current sample, and similar to previous research (Burgess & Webley, 2000; Davey et al., 2006), speeding is often perceived as an acceptable behaviour in some circumstances.

Between-group analyses identified few meaningful differences within the DBQ or SCQ scales. As highlighted in Table 2, means were similar for the DBQ. The greatest mean differences on the SCQ sub-scales were between communication and support and adequacy of fleet safety procedures $F(1, 181) = 27.60$, $p = .000$ and communication and support and management commitment $F(1, 181) = 25.99$, $p = .000$. In addition, Table 2 reports the mean and standard deviation scores for the two highest ranked items for each of the three measurement tools.

Table 2. *Mean Scores for the survey factors*

Factors	***M***	***SD***
SCQ		
Fleet Safety Rules	5.59	1.41
Communication and Support	5.20	1.51
Work Pressures	5.26	1.40
Adequacy of Fleet Safety Procedures	5.61	1.46
Management Commitment	5.69	1.36
SCQ Highest Ranked Items		
1. The taxi operator's or depot manager's expectations encourage safe driving	5.81	1.47
2. The taxi operator or depot manager ensures taxis are well maintained	5.67	1.66
DBQ		
Errors	1.86	.80
Highway Code Violations	1.89	.99
Aggressive Violations	2.03	1.14
DBQ Highest Ranked Items[1]		
1. Intentionally exceed the speed limit on a highway/freeway	2.13	1.26
2. Missed 'Stop' or 'Give Way' signs	2.10	1.19
DAQ		
Alcohol	6.40	1.04
Close Following	5.75	1.39
Overtaking	5.93	1.29
Speeding	4.39	1.89
DAQ Highest Ranked Items		
1. Drink driving isn't really a serious road safety problem	6.64	1.31
2. It's OK to have a few alcoholic drinks before driving home after work at the end of the day	6.36	1.43

Intercorrelations between Variables

An examination was undertaken to determine the bi-variate relationships between the SCQ, DBQ, DAQ factors as well as socio-demographic variables. As expected, strong relationships appeared evident between the DAQ factors, with the highest correlation being between close following and risky overtaking (r = .70**). That is, those who reported an unwillingness to engage in risky overtaking manoeuvres were also unlikely to perceive close following as an acceptable driving behaviour. Similar results were also found between the DBQ factors, with the strongest bi-variate relationship identified between highway-code violations and errors (r = .66**). As a result, those who engaged in highway-code violations (i.e., speeding) were also more likely to commit errors while driving. A similar significant bi-variate relationship was identified between highway-code and aggressive violations (r = .65**). For example, those who engaged in highway-code violations (i.e., speeding) were also more likely to exhibit aggressive acts while driving. In contrast, to previous research (Davey et al., 2006) strong correlations were generally evident between the SCQ

[1] Lower scores represent safer driving behaviours.

factors, with the highest correlations being between adequacy of procedures and both communication and support (r = .74**) and management commitment (r = .71**).

In regards to bi-variate relationships between the questionnaires, significant negative correlations were evident between all the DBQ and DAQ sub-factors (i.e., behaviours vs attitudes), as those who perceived aberrant driving behaviours such as speeding as serious were subsequently less likely to actually engage in such behaviours over the previous six month period (i.e., r = -.42**). Similar negative correlations were identified between the DBQ and SCQ factors, as the positive work environment which provided fleet safety rules, procedures and support resulted in lower levels of self-reported aberrant driving behaviour. For example, management commitment was negatively correlated with driving errors (r = -.27**), highway violations (r = -.31**) and aggressive violations (r = -.28**). In regards to the association between DAQ and SCQ factors, weaker correlations were identified with the strongest relationship being between overtaking and management commitment (r = .31**). In contrast to previous research (Davey et al., 2006) no significant relationship was identified between the sample characteristics (e.g. age, driving experience, etc) and the three questionnaire factors. However, initial univariate analysis indicated that drivers who travelled less kilometres per week reported less safe driving behaviours for all the DBQ sub-scales. Therefore, a series of between-group analysis was conducted between all three measurement tool sub-scales and two categories of driver exposure (1 = <500 km/week and 2 = >500 km/week). The analysis revealed that taxi drivers in this sample who drove 500 kilometres or less per week also reported committing a higher frequency of driving errors $t(1, 179) = 2.45$, p = .015 (M = 2.17 vs M = 1.79). In contrast, no other DBQ, DAQ, or SCQ sub-scale differences were identified between those who travelled less than 500 kilometres per week and those that travelled more than 500 kilometres per week.

Prediction of Crashes and Traffic Offences

The second part of the study aimed to examine the relationship between participants' driving behaviours and attitudes (as measured by the DBQ, DAQ and SCQ) and self-reported crash and demerit point loss. Due to the relatively small number of participants who reported a work-related crash in the last 12 months (N = 38) or work-related driving infringements (N = 52), the implementation of multivariate models of prediction (e.g., logistic regression) were not undertaken due to the uneven sample sizes. Rather, a series of between-groups analyses utilising the three measurement tools and socio-demographic factors was conducted focussing on traffic infringement notices. However, it is noteworthy that the only significant difference was identified with "years experience driving taxis" $t(1, 172) = 2.41$, p = .017, which revealed that relatively inexperienced taxi drivers are susceptible to incurring demerit point loss.

DISCUSSION

The present paper aimed to report on the utilisation of a range of self-report driving measurement tools (e.g., DAQ, DBQ & SCQ) to conduct an investigation into the driving behaviours of a group of Australian taxi drivers. In addition, the research aimed to investigate whether taxi drivers' attitudes and behaviours regarding road safety issues were associated with crash and/or traffic offence involvement. Presently, only a small body of research has examined the self-reported driving attitudes and behaviours of fleet drivers (Davey et al., 2006; Davey et al., 2007; Sullman et al., 2002), with less research focusing on the driving conduct of taxi drivers despite the potential for such data to be utilised in fleet interventions designed to reduce the burden of crash involvement.

Firstly, analysis of the measurement tools' internal consistency through alpha coefficients indicated that the DBQ and SCQ were moderately robust, with the results similar to previous research that has utilised the questionnaires (Blockey & Hartley, 1995; Dobson et al., 1999; Sullman et al., 2002; Wills, 2006). In contrast, to previous research (Davey et al., 2006) the abbreviated DAQ's internal

consistency for the overtaking and speeding factors was moderately robust. However, the internal consistency for the alcohol and close following factors remains relatively low. Further research is necessary to determine the psychometric properties of the abbreviated questionnaire, and its subsequent usefulness within work-related driving research arenas.

Secondly, examination of the mean scores for the DBQ, DAQ and SCQ factors revealed that participants generally reported positive attitudes and behaviours towards road safety. In regards to attitudes, similar to previous research (Davey et al., 2006; Meadows, 2002), respondents reported drink driving as the most serious driving behaviour. Participants also reported risky overtaking and close following practices were an additional unacceptable behaviour, while attitudes towards speeding were more lenient. This finding is consistent with research which has indicated speeding is the most common form of aberrant driving behaviour reported by motorists (Davey et al., 2007; Lajunen et al., 2003; Parker et al., 1995). As a result, it appears taxi drivers core risky driving behaviours are similar to that of other fleet drivers e.g., speeding.

In regards to the relationship between the measurement tools, negative associations were identified between attitudes and the corresponding behaviours. That is, participants who agreed with the seriousness of the specified aberrant driving behaviours were less likely to report engaging in such behaviours over the past six months (e.g., DBQ speeding factor). Furthermore, the bi-variate correlations also provided a preliminary indication that the culture of the organisation, in particular the direction provided by the management team, is associated with driving behaviours. For example, the collected data generally indicates that the current organisation provided relatively clear fleet safety rules, adequacy of fleet safety procedures as well as strong management commitment, which was negatively associated with engaging in the aberrant driving behaviours. While only preliminary, the results indicate that the "safety climate[2]" of a taxi company or organisation has the potential to directly impact upon the driving outcomes exhibited by employees.

Despite the positive appraisal regarding the safety climate of the organisation, 38 participants reported being involved in a crash and 52 participants reported incurring a traffic offence while driving taxis in the past 12 months. Surprisingly, exposure to the road (i.e. kilometres per week and hours driving taxis per week) did not significantly influence driver behaviours and crash or demerit point loss in this sample of taxi drivers, although it is noted this may stem from the small sample size. Rather, results of a series of between-groups analyses utilising the three measurement tools and categories of drivers that travelled either less than 500 or greater than 500 kilometres per week revealed that drivers who travelled less than 500 kilometres per week consistently report a higher rate of errors. This may indicate that part-time/casual type drivers (due to low kilometres travelled) are more at risk of committing errors while driving a taxi. This result may also provide an opportunity for taxi company management to identify those at risk through reduced exposure, and ensure such drivers receive appropriate interventions and supervision to reduce the likelihood of making driving errors. Similarly, it appears that taxi driving inexperience is related to demerit point loss. For example, the data revealed that more inexperienced drivers were more likely to be involved in traffic offences. Again this provides an opportunity for taxi company management to identify at risk drivers and initialise interventions to reduce the risks associated with this group. For example, targeting new taxi drivers during their initial induction/training process by the inclusion of interventions aimed at proactively addressing drivers' attitude and behaviour.

In summary, the results may prove to have direct implications for taxi operational interventions, not only through supervising and monitoring the driving performance of drivers, but also through proactive measures to reduce the risk to drivers and supporting positive driver attitude and behaviours. Importantly, this process is aimed at reducing the likelihood of a work-related

[2] Safety climate has been defined as a psychological product of the behavioural and cultural ingredients within an organisation (Wills et al., 2006).

crash/offence before the event occurs, rather than by the traditional post hoc analysis of fleet databases (Davey et al., 2007).

Limitations

A number of limitations should be taken into account when interpreting the results of this study. The response rate of participants was low and questions remain regarding the reliability of the self-reported attitudes e.g., self-report bias. Questions remain about the representativeness of the sample as the participant pool was drawn from one regional area and such driving styles may not be easily transferable to other taxi driving populations in metropolitan areas. In summary, further research is required to establish the reliability and validity of the scales for the Australian taxi setting and the usefulness of the tool in informing road safety interventions for taxi drivers.

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